EXHIBIT 1

Average Spectrum Holdings (MHz) in Licensed Markets and Shares¹ Cellular, 700MHz, PCS, and AWS Bands Top 50 Markets²

		Cellular			700MHz		Cellular and 7	00MHz Bands		PCS			AWS		PCS and A	WS Bands
	Average Spectrum (MHz)	No. of Licensed Markets	Spectrum Share	Average Spectrum (MHz)	No. of Licensed Markets	Spectrum Share	No. of Licensed Markets	Spectrum Share	Average Spectrum (MHz)	No. of Licensed Markets	Spectrum Share	Average Spectrum (MHz)	No. of Licensed Markets	Spectrum Share	No. of Licensed Markets	Spectrum Share
Verizon ³	29	41	47%	31	49	43%	49	45%	20	49	15%	22	34	16%	49	16%
Verizon + Cable ³	29	41	47%	31	49	43%	49	45%	20	49	15%	34	49	37%	49	24%
AT&T4,5	29	44	51%	28	50	40%	50	45%	34	50	26%	15	18	6%	50	18%
Sprint	0	0	0%	0	0	0%	0	0%	35	50	27%	0	0	0%	50	16%
T-Mobile ⁵	0	0	0%	0	0	0%	0	0%	27	50	21%	32	50	36%	50	27%
Leap ³	0	0	0%	12	1	0%	1	0%	11	19	3%	14	29	9%	29	6%
MetroPCS	0	0	0%	12	1	0%	1	0%	18	12	3%	13	15	4%	19	4%

Notes:

- 1 Spectrum share is calculated as a carrier's total spectrum holdings in the top 50 markets divided by total licensed spectrum in the top 50 markets.
- 2 Spectrum holdings by Cellular Market Area (CMA) calculated as the population-weighted average of spectrum holdings by county within each CMA. Calculations do not incorporate SMR or BRS spectrum.
- 3 Verizon and Leap spectrum holdings are adjusted to reflect spectrum swap pending approval by the FCC.
- 4 AT&T spectrum holdings are adjusted to reflect its acquisition of Qualcomm licenses, which was approved by the FCC on December 22, 2011.
- 5 AT&T and T-Mobile spectrum holdings are adjusted to reflect AT&Ts transfer of spectrum to T-Mobile, which is pending approval by the FCC.

Sources:

- [A] FCC license database.
- [B] Verizon Wireless-Cox Application materials are available at http://transition.fcc.gov/transaction/verizonwireless-spectrumcocox.html.
- [C] AT&T and Qualcomm WT Docket No. 11-18, available at http://transition.fcc.gov/transaction/att-qualcomm.html.
- [D] T-Mobile License and AT&T Mobility WT Docket No. 12-21, available at http://transition.fcc.gov/transaction/tmobilelicense-attmobility.html.
- [E] Verizon Wireless and Leap Wireless spectrum swap materials are available at http://transition.fcc.gov/Daily_Releases/Daily_Business/2012/db0119/DA-12-69A1.pdf.

EXHIBIT 2

Verizon Spectrum Holdings Cellular, 700MHz, PCS, and AWS Bands Top 50 Markets¹

			Ver	izon	Verizon + Cable	
	Market	POPs	Spectrum (MHz)	Spectrum Share	Spectrum (MHz)	Spectrum Share
[1]	Los Angeles-Long Beach/Anaheim-Santa Ana-Garden	17,174,570	91	27%	111	33%
rai	Grove/Riverside-San Bernardino-Ontario, CA	17 000 740	110	250/	120	410/
[2]	New York, NY-NJ/Nassau-Suffolk, NY/Newark, Jersey	16,808,740	119	35%	139	41%
[3]	City and Paterson-Clifton-Passaic, NJ	0 507 560	00	2/0/	****	200/
	Chicago, IL	8,507,569	89	26% 19%	109	32%
4.14	Dallas-Fort Worth, TX	6,557,576	64 79		84	25%
	Houston, TX	5,637,211	99	23%	109	32%
	Philadelphia, PA Atlanta, GA	5,289,675 4,914,273	89	29% 26%	119 109	35% 32%
	Washington, DC-MD-VA		109	32%	129	
	Detroit/Ann Arbor, MI	4,809,725	99	29%	119	38%
	Boston-Lowell-Brockton-Lawrence-Haverhill, MA-NH	4,733,459 4,508,380	97	29%	117	35% 34%
	San Francisco-Oakland, CA	4,375,435	69	20%	89	26%
			96	28%	2000	
	Miami-Fort Lauderdale-Hollywood, FL Phoenix, AZ	4,302,210	82	24%	116 102	34%
	Minneapolis-St. Paul, MN-WI	4,087,980 3,133,944	119	35%	139	30% 41%
	San Diego, CA	BANKS TO THE PARTY OF THE PARTY	67	20%	87	26%
	Denver-Boulder, CO	3,088,346	79		99	29%
	Baltimore, MD	2,804,706 2,655,604	109	23% 32%	129	38%
	Seattle-Everett, WA		97	29%	117	34%
	St. Louis, MO-IL	2,652,469	77		77	
		2,636,325	1000	23%		23%
	Tampa-St. Petersburg, FL	2,593,519	109	32%	129	38%
	San Juan-Caguas, PR	2,271,749	0	0%	0	0%
	Portland, OR-WA	2,119,028	67	20%	87	26%
	Sacramento, CA	1,973,687	69	20%	89	26%
	Pittsburgh, PA	1,959,627	87	26%	107	31%
	Las Vegas, NV	1,926,570	67 64	20%	87	26%
	San Antonio, TX	1,926,040	89	19%	84	25%
	Kansas City, MO-KS	1,867,083	69	26%	109	32%
	San Jose, CA	1,813,429	84	20%	89	26%
	Orlando, FL	1,787,599	270.0	25%	104	31%
	Cleveland, OH	1,781,739	124	36%	144	42%
	Indianapolis, IN	1,715,519	89	26%	109	32%
	Cincinnati, OH-KY-IN	1,689,049	111	33%	111	33%
	Salt Lake City-Ogden, UT	1,654,325	57	17%	77	23%
100	Austin, TX	1,641,645	64	19%	84	25%
	Columbus, OH	1,580,339	97	29%	117	34%
	Milwaukee, WI	1,568,884	72	21%	92	27%
	Nashville-Davidson, TN	1,521,132	77	23%	97	29%
	Charlotte-Gastonia, NC	1,349,794	134	39%	154	45%
	Jacksonville, FL	1,339,750	82	24%	102	30%
	Raleigh-Durham, NC	1,333,905	134	39%	154	45%
	West Palm Beach-Boca Raton, FL	1,290,147	96	28%	116	34%
	Greensboro-Winston-Salem-High Point, NC	1,237,144	124	36%	144	42%
	Hartford-New Britain-Bristol, CT	1,200,820	89	26%	109	32%
	Memphis, TN-AR-MS	1,197,246	89	26%	109	32%
	Oklahoma City, OK	1,193,409	101	30%	121	36%
	Buffalo, NY	1,123,559	87	26%	87	26%
	Norfolk-Virginia Beach-Portsmouth, VA/NC	1,099,797	112	33%	132	39%
100	New Orleans, LA	1,092,333	97	29%	117	34%
	Louisville, KY-IN	1,046,107	77	23%	97	29%
[טכ	Rochester, NY	1,037,977	89	26%	109	32%
	Weighted Average for Top 50 Markets		91	27%	110	32%

Note:

1 Spectrum holdings by Cellular Market Area (CMA) calculated as the population-weighted average of spectrum holdings by county within each CMA. Calculations do not incorporate SMR or BRS spectrum. Verizon and Leap spectrum holdings are adjusted to reflect spectrum swap pending approval by the FCC. AT&T spectrum holdings are adjusted to reflect its acquisition of Qualcomm licenses, which was approved by the FCC on December 22, 2011. AT&T and T-Mobile spectrum holdings are adjusted to reflect AT&T's transfer of spectrum to T-Mobile, which is pending approval by the FCC.

Sources:

- [A] FCC license database.
- [B] Verizon Wireless-Cox Application materials are available at http://transition.fcc.gov/transaction/verizonwireless-spectrumcocox.html.
- [C] AT&T and Qualcomm WT Docket No. 11-18, available at http://transition.fcc.gov/transaction/att-qualcomm.html.
- [D] T-Mobile License and AT&T Mobility WT Docket No. 12-21, available at http://transition.fcc.gov/transaction/tmobilelicense-attmobility.html.
- [E] Verizon Wireless and Leap Wireless spectrum swap materials are available at http://transition.fcc.gov/Daily_Releases/Daily_Business/2012/db0119/DA-12-69A1.pdf.

EXHIBIT B

Declaration of Neville R. Ray

Before the FEDERAL COMMUNICATIONS COMMISSION Washington, D.C. 20554

In the Matter of)	
)	
Application of Cellco Partnership d/b/a)	
Verizon Wireless and SpectrumCo LLC)	
For Consent To Assign Licenses)	WT Docket No. 12-4
•)	
Application of Cellco Partnership d/b/a)	
Verizon Wireless and Cox TMI Wireless, LLC)	
For Consent To Assign Licenses)	

DECLARATION OF NEVILLE R. RAY

1. I, Neville R. Ray, am the Chief Technology Officer at T-Mobile USA, Inc. I joined T-Mobile in 2000 and have been involved in mobile radio technology for more than 20 years, including in the prior posts of Chief Network Officer and Senior Vice President for Engineering and Operations at T-Mobile. In my current capacity, I am responsible, among other things, for overseeing the management of the company's wireless network, which includes approximately 52,000 cell sites, as well as T-Mobile's WiFi HotSpot network in the U.S. I also oversee the continued growth of the current network along with the rollout and launch of future networks. My experience includes the many aspects of wireless network design and deployment including radio planning & optimization; wireless switching; base station equipment design, operation and maintenance; data transmission; cell site design and construction; transport facilities planning and management. Prior to joining T-Mobile, I was Vice President of Engineering and Operations for Pacific Bell Wireless, a GSM wireless operator in California. I also served as a Principal Consultant for PA Consulting, a UK/US management consulting firm.

I hold a BSc Honors Degree in Engineering, earned in London. I am a member of the Institution of Electronics and Electrical Engineers and of the Institution of Civil Engineers. I am also the chairman of 4G Americas, an industry association that promotes the advancement of 3GPP technologies such as GSM, HSPA and LTE.

- 2. In this Declaration, I will address two areas of concern for the Federal Communications Commission ("FCC") as it assesses whether the proposed acquisition of spectrum by Verizon Wireless from SpectrumCo and Cox is in the public interest. First, I will discuss the fact that in the construction of wireless broadband networks, all spectrum is not equal. Thus, in applying its spectrum screen, the FCC must recognize that low-band spectrum (below 1 GHz) is intrinsically more useful and valuable for mobile broadband deployment than an equal quantity of high-band (such as AWS, PCS, or BRS) spectrum. Low-band spectrum enables the construction of mobile broadband networks using significantly less infrastructure, while providing greater coverage and better user-perceived coverage reliability than networks solely operating on high-band spectrum. Unless the FCC differentiates between low-band and high-band spectrum, the licensees of low-band spectrum - Verizon Wireless in particular - will increase their significant competitive advantage to the detriment of wireless consumers as a whole and licensees like T-Mobile that are solely reliant upon high-band spectrum. I will also discuss the fact that much of the spectrum that Verizon Wireless proposes be added to the screen is not suitable for wireless broadband, and should continue to be kept out of the screen.
- 3. The second area I address is the fact that Verizon Wireless has far less incentive, if it is allowed to acquire the Cable Companies' spectrum, than smaller carriers like T-Mobile have to deploy that spectrum quickly, effectively, and efficiently to provide broadband service to consumers in the United States. This is because Verizon Wireless already holds a market

dominating portfolio of spectrum licenses – especially in the most desirable low-band spectrum below 1 GHz and greenfield spectrum ideal for 4G service. Yet much of Verizon Wireless' already significant holdings of AWS spectrum holdings lie fallow today. This is despite the almost complete clearance of legacy users from the AWS band and the ready availability of AWS-capable devices. Instead Verizon Wireless has chosen to hold this spectrum in reserve for future use, giving it plenty of "headroom" to open new services to which users can move at leisure, while putting no constraint on its older "legacy" services.

4. Operating under much greater spectrum constraints than Verizon Wireless, T-Mobile has rolled out its 4G network, by deploying the AWS spectrum it won at auction in 2006. Since clearing AWS spectrum market by market, T-Mobile has made intensive use of its spectrum licenses so that today almost all T-Mobile's spectrum holdings are used to provide consumers with wireless services. Because T-Mobile is intensively using its AWS spectrum to provide current services, it is now starting a complex and costly program of [***BEGIN

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[***END CONFIDENTIAL***]. However, this is a near- and medium-term solution only, and no matter how clever T-Mobile may be, as usage grows, T-Mobile will simply need more spectrum to effectively compete. Among other things, T-Mobile faces constraints that will keep it from having the same spectrum depth for LTE as others.

¹ Deutsche Bank Markets Research, "Key Updates on Major Spectrum Deals," Feb. 5, 2012 at p.1: "[Verizon Wireless] already controls more 4G spectrum than AT&T, Sprint and T-Mobile combined."

The Differing Suitability of Spectrum for Wireless Broadband.

- Treating all spectrum the same masks the inherent competitive strength of more valuable low-band spectrum and unjustifiably elevates the competitive value of less valuable high-band spectrum.
- 6. As the FCC has repeatedly observed: "Lower frequency bands ... possess more favorable intrinsic spectrum propagation characteristics than spectrum in higher bands. 'Lowband' spectrum can provide superior coverage over larger geographic areas, through adverse climate and terrain, and inside buildings and vehicles."²
- 7. Likewise, market participants have also noted that the lower frequency bands have advantages in rural areas.³
- 8. As a result of its superior propagation characteristics, networks using low-band spectrum can generally be constructed to serve the same number and distribution of users at much less expense, because fewer and more widely dispersed cell sites can be deployed.

 Because spectrum propagation varies inversely with the square of frequency, spectrum at 700 MHz can cover the same area with as few as one-fourth to one-fifth as many cell sites as would be required in the AWS band and provide better in-building signal penetration. The FCC has recognized this: "Low-band spectrum can provide the same geographic coverage, at a lower cost than higher-frequency bands.... A licensee that exclusively or primarily holds spectrum in a higher frequency range generally must construct more cell sites (at additional cost) than a

Application of AT&T Inc. and Qualcomm Inc. for Consent to Assign Licenses and Authorizations, Memorandum Opinion and Order, WT Docket No. 11-18, FCC 11-118, para. 49 (2011) ("AT&T-Qualcomm Order").

Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services, Fifteenth Annual Report, WT Docket No. 10-133, FCC 11-103, 26 FCC Rcd 9664 at para. 292, Tables 1 and 2 (2011) ("Fifteenth Annual Report").

licensee with primary holdings at a lower frequency in order to provide equivalent service coverage, particularly in rural areas."

- 9. Conversely, spectrum in the EBS and BRS 2.5 GHz bands has below average signal propagation and building penetration. Licensees must construct more cell sites while getting suboptimal consumer coverage experiences and there are fewer handsets and infrastructure products available that use this spectrum. Both of these factors result in higher expenses for providers and thus for consumers.
- 10. Some parts of the spectrum currently included in the screen are simply not usable for wireless broadband now for technical or regulatory reasons, and should be removed. For example, the FCC has already recognized that "broadband operations using [a portion of] SMR spectrum have not been shown to be viable pending completion of 800 MHz rebanding, given the interference protection provided to neighboring public safety operations. In addition, the commercial SMR spectrum in the 900 MHz band currently is interleaved with Business/Industrial/Land Transportation services, and thus is better suited for narrowband deployments." Likewise, the 700 MHz D Block has not been auctioned and Congress has passed legislation to remove it from the pipeline for commercial services. ⁶
- 11. Verizon Wireless (see Public Interest Statement at 29-33) has proposed various other spectrum bands for inclusion in the screen, but none of them is suitable for inclusion. For example, only 55.5 MHz of the BRS spectrum has been included in the screen. The FCC has repeatedly rejected arguments to include the remainder of the BRS spectrum comprised of the Middle Band Segment ("MBS"), BRS Channel 1, and J and K bands, and its inclusion remains

⁴ Fifteenth Annual Report at para. 293.

⁵ Fifteenth Annual Report at para. 290.

⁶ H.R. 3630 at § 6101.

unwarranted. The MBS channels are not suitable since they are subject to interference from high-power video operations. The J and K guard bands are not suitable since they are secondary to adjacent-channel operations and are only 1/3 MHz wide. BRS Channel 1 is not contiguous to other BRS channels, and is adjacent to EBS Channel A1, which is not included in the screen. Other carriers have also argued that it is not suitable for mobile use since it is subject to interference and encumbered with three other co-primary uses.⁷

- 12. EBS, another Verizon Wireless candidate for addition, was allocated for educational and cultural use by school and universities. While excess capacity in the spectrum may be leased for commercial use, it is still subject to primary use as an educational tool. In addition, its technical character makes it difficult to use for commercial purposes in rural areas.
- 13. With regard to MSS/ATC (LightSquared, DISH) spectrum, the availability of this spectrum for wireless broadband is speculative at best, and its inclusion remains unwarranted. In response to NTIA concerns regarding GPS interference, the FCC's International Bureau is proposing to vacate the LightSquared conditional authorization to provide wireless mobile services and suspend indefinitely LightSquared's underlying ATC authorization. And the DISH transfer application and waiver request to provide terrestrial service using the Mobile Satellite Service S band spectrum are still pending, with the waiver request in particular proving controversial.
- 14. The Wireless Communication Service (WCS) band is adjacent to the Satellite Digital Audio Radio Service (SDARS) band and technical limitations to avoid interference

Sprint Nextel Corporation and Clearwire Corporation Applications for Consent to Transfer Control of Licenses, Leases, and Authorizations, WT Docket No. 08-94, Memorandum Opinion and Order, 23 FCC Rcd 17570, paras. 59, 68 (2008) ("Sprint Nextel-Clearwire Order").

See Public Notice, "International Bureau Invites Comment On NTIA Letter Regarding LightSquared Conditional Waiver, IB Docket No. 11-109, released Feb. 15,2012.

prevented use of this spectrum for mobile services. In May 2010, the FCC revised the rules to protect SDARS but allow mobile operations. This spectrum should continue to be excluded since the new technical rules are still under appeal. Moreover, there is no commercial equipment that uses this band available in the US market today, suitable for providing 4G services under the current restrictive technical limitations.

Relative Incentives to Achieve Spectrum Efficiency.

- 15. As noted above, Verizon Wireless already, even before the proposed transaction, has a considerable spectrum advantage over T-Mobile. As of the FCC's *Fifteenth Annual Report* (Table 28), the FCC estimated that Verizon Wireless had average spectrum holdings of 83.4 MHz, with 51.7 MHz below 1 GHz, while T-Mobile, by contrast, had 47.7 MHz, *none* of it below 1 GHz except for one cellular license in a small South Carolina CMA.⁹
- T-Mobile has led the industry in quickly and efficiently deploying spectrum, especially in the AWS band. By contrast, Verizon Wireless is likely to continue to warehouse its AWS spectrum to meet anticipated future, not present needs, just as it has historically done. For example, Verizon Wireless makes limited use of its 20 MHz of AWS spectrum covering about 2/3 of the country today, though it has held this spectrum since it was auctioned in 2006, as well as the 12 MHz of 700 MHz Block A spectrum, which it has held since 2008. Evidently, Verizon Wireless plans to wait for suitable technology so that it can combine the SpectrumCo and Cox AWS spectrum with its existing AWS spectrum before using it to provide consumer broadband. In his

² Since then, T-Mobile has increased its holdings slightly (to a comparable nationwide number (as used in the Fifteenth Annual Report) of about [***BEGIN CONFIDENTIAL***] [***END CONFIDENTIAL***]), and would gain more (to [***BEGIN CONFIDENTIAL***] [***END CONFIDENTIAL***]) if the assignment to it of AT&T spectrum pursuant to the break-up is approved by the FCC. However, this will only make a small difference in the disparity.

Declaration, Mr. William Stone, Verizon Wireless' Executive Director of Network Strategy, states that Verizon Wireless will use the new spectrum, combined with its existing AWS holdings, to supplement its 700 MHz spectrum for this purpose. He explains that "Our other spectrum holdings are either not available or not as suitable for this purpose as is AWS. Our cellular (850 MHz) and PCS (1.9 GHz) licenses are fully deployed to provide our nationwide CDMA Ev-DO Rev A and 1X services, which currently carry the lion's share of our data and SMS traffic and all of our voice traffic." In other words, under Verizon Wireless' approach, it seeks only to pad further its already more-than-sufficient spectrum "headroom" to deploy LTE at its leisure instead of using the efficiency-maximizing techniques we and other smaller carriers have used and are using to speed deployment.

- 17. This spectrum "overhead" is a luxury that most carriers such as T-Mobile do not have. T-Mobile does not have sufficient spectrum to bank large contiguous spectrum blocks while it accumulates more spectrum to provide LTE alongside its legacy services. Rather, T-Mobile's spectrum has been fully utilized consistently. Instead, T-Mobile must find ways to use its existing spectrum ever more efficiently, freeing up capacity to serve consumers.
 - 18. The primary process we use to maximize efficient use of our spectrum is

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Application of Cellco Partnership d/b/a Verizon Wireless and Cox TMI Wireless, LLC for Assignment of Licenses, File No. 0004996680, Declaration of William H. Stone, Executive Director, Network Strategy, Verizon Wireless, para. 28 ("Stone Declaration").

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19.	As part of this process, we must [***BEGIN CONFIDENTIAL***]
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20.	Once we have successfully [***BEGIN CONFIDENTIAL***]
	[***END CONFIDENTIAL***] we can [***BEGIN
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do on the exist	ting [***BEGIN CONFIDENTIAL***] [***END CONFIDENTIAL***]
network to pre	epare for this transition. We must carry out new [***BEGIN
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E THE LAN	
	[***END CONFIDENTIAL***]. We have
also been at th	e forefront of using WiFi as a complement to licensed spectrum for capacity
offload and co	verage enhancement.

- 21. This all takes time, careful planning, and expense. While this [***BEGIN CONFIDENTIAL***] [***END CONFIDENTIAL***] is going on and when it is done, we must install all the equipment and build and modify cell sites to support the new services.
- 22. Notwithstanding the complexity, expense and consumption of time and internal resources this process requires, T-Mobile has successfully carried out this process in the past on a smaller scale and is committed to doing so in the future. But T-Mobile's customers continue to demand more and more data usage, and to compete successfully, we must meet this demand.

 There are limits to what we can do with existing spectrum, however, including limits to our ability [***BEGIN CONFIDENTIAL***]

 [***END CONFIDENTIAL***] no matter how much efficiency we wrest out of what we have today. For this reason, even to the extent we might be able to locate new spectrum, we will be highly motivated to continue our efficiencies, as demand growth continues inexorably. Other spectrum-constrained carriers have similar incentives, but Verizon Wireless does not.
- 23. Verizon Wireless has no need to engage in [***BEGIN CONFIDENTIAL***]

 [***END CONFIDENTIAL***] on the scale described above. With its unused AWS spectrum and underused 700 MHz spectrum, it can simply deploy new technologies without the complexities and additional costs of migrating existing users, and without [***BEGIN CONFIDENTIAL***]

 [***END CONFIDENTIAL***] as we must do. In other words, Verizon Wireless does not face the same challenges that we and others face and

See Wall Street Journal, "Confessions of an iPhone Data Hog", Jan. 27, 2012, citing an survey showing T-Mobile customers use the most data bandwidth of any of the four largest carriers:. "An NPD Connected Intelligence study of 700 Android smartphone users found they used 724 megabytes per month on AT&T's network. The average was 1.7 gigabytes on T-Mobile, 902 megabytes on Verizon Wireless and 1.2 gigabytes on Sprint."

does not have the same incentives to use even its existing spectrum, let alone the SpectrumCo and Cox spectrum, as efficiently as we and others do and would.

Wireless do not work on the AWS band. Indeed, Verizon Wireless has produced no handsets at all, including for LTE, to operate in AWS, even though Verizon Wireless has held substantial AWS assets since the conclusion of Auction No. 66 over five years ago. By contrast, T-Mobile has been a pioneer in the band, clearing it of extensive federal government uses in only two years, and developing new and unique equipment for the band to deploy advanced broadband services for our customers rapidly and efficiently. Moreover, Verizon Wireless' Public Interest Statement and technical declarations provide no insight on the LTE technology features it plans to employ even at this date to put this spectrum to use with their existing network. Other operators (Sprint, AT&T, Clearwire) have already announced that they plan to move to LTE-Advanced using unused or refarmed spectrum. Verizon Wireless, on the other hand, has been largely silent about its future intentions for network evolution. [***BEGIN

[***END CONFIDENTIAL***] and to address the spectrum constraints T-Mobile faces that I describe above.

[SIGNATURE ON NEXT PAGE]

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct to the best of my knowledge, information, and belief. Executed this 21st day of February, 2012.

Neville R. Ray

EXHIBIT C

Declaration of Peter Cramton

Declaration of Peter Cramton

I, Peter Cramton, hereby declare the following:

Qualifications

1. I am Professor of Economics at the University of Maryland and Chairman of Market Design Inc. My specialty is the design of complex auction markets. Since 1993, I have contributed extensively to the development of spectrum auctions. I have advised ten governments on spectrum auctions, including the United States. I am currently advising the United Kingdom, Canada, and Australia on 4G auctions. I have advised 36 bidders in major spectrum auctions around the world. I have written dozens of widely-cited practical papers on spectrum auctions. This research is available at www.cramton.umd.edu/papers/spectrum.

Summary

- 2. I have been asked by T-Mobile USA, Inc. to comment on the FCC's spectrum screen as it should be applied to Verizon's proposed acquisition of spectrum from SpectrumCo and Cox.
- 3. The current screen is ineffective in measuring the competitive effects of spectrum acquisitions, especially since the screen is meant to establish a safe-harbor presumption of no anticompetitive effect. The screen must be revised to address its chief flaw: the screen treats all mobile broadband spectrum as equal regardless of its frequency.
- 4. In fact, the different bands have quite different propagation characteristics, which make them more or less valuable for providing mobile broadband service. The low-frequency spectrum below 1 GHz allows much improved coverage depth (within buildings and other obstructions) and breadth (in less populated areas) compared with the spectrum above 1 GHz. This coverage advantage is an important competitive advantage, which makes the low-frequency spectrum much more valuable than the high-frequency spectrum. The value per MHz can differ by a factor of 10 or more, as demonstrated in recent auctions in Germany and Italy. Thus, a provider having a relatively smaller allocation of high-quality spectrum can be in an advantageous position compared to a provider with only lower-quality spectrum, even if the latter has considerably more spectrum than the former measured in MHz.
- 5. While purporting to establish a presumption of no competitive harm, the current screen in fact permits, and even encourages, an unlimited concentration of the most valuable spectrum, such as the cellular and 700 MHz bands, in the hands of a few carriers. Unless the screen is improved, it will allow this trend to continue.
- A simple and beneficial revision to the screen is to weight the spectrum holdings in different bands by relative values. Value-based measures are used in many industries where quantities alone are misleading due to substantial quality differences of the product.
- 7. The relative value differences across bands are well-understood by market participants and industry experts and are reported in investment banking studies that analyze the competitive advantages to

the holders of the different bands. They are also fairly stable. Under a value-based screen the FCC would assign weights to each band, such as the following (explained later in the declaration):

Band	Value weight		
Cellular	1.7		
700 MHz	1.5		
SMR	1.5		
AWS/PCS	.75		
BRS	.20		

- Then the carrier's total spectrum holdings would be calculated as the value-weighted sum of its
 holdings. The spectrum screen is triggered in any region where the carrier's value-weighted sum
 exceeds a threshold, such as one-third of the total of all spectrum calculated on the same weighted
 basis.
- The value-based screen greatly improves the measurement of the capability of the spectrum holdings and therefore improves the screen's usefulness as a proxy for competitive effects. With this improved measure, the screen can be adjusted to increase the chance that problematic transactions are identified.
- 10. In sum, consistent with practice in past proceedings, the FCC should revise the spectrum screen to improve its ability to detect problematic spectrum aggregation. The screen should be value-weighted to reflect substantial differences in the quality of the spectrum in different bands.

The spectrum screen is flawed and must be revised

- 11. The FCC has used a variety of spectrum caps and spectrum screens over the years as a policy tool to encourage effective competition. This policy has consistently recognized that allowing any carrier to acquire an excessive share of the essential spectrum input could result in higher prices and less consumer benefit from wireless service.
- 12. Since 2004, the spectrum screen has been the primary instrument used in evaluating whether spectrum transactions should be subject to in-depth scrutiny for potential anticompetitive impact in a given market. Unfortunately, the spectrum screen in its current form is a poor instrument for this purpose. The screen can be improved to ameliorate its greatest flaw: its failure to measure the relative competitive value of different bands of spectrum.
- 13. The screen serves as a safe harbor guideline. Transactions that would result in spectrum holdings that fall below the screen are deemed presumptively to be in the public interest without further market evaluation. The effectiveness of such a screen depends on how well the screen measures competition concerns. This will happen only if it ensures that the safe harbor covers only acquisitions that pose no competitive concerns. Since the screen is not a cap and does not establish a presumption of competitive harm, companies have an opportunity to argue the merits of a transaction that exceeds the screen. Since 2004, the screen has been revised several times as part of

- spectrum acquisition reviews. The current screen is 145 MHz—approximately one-third of the available mobile broadband spectrum. However, the FCC recently alluded to its interest in reducing the screen to 141 MHz in the context of AT&T's purchase of 700 MHz spectrum from Qualcomm.
- 14. To illustrate the problem with the current screen, note that the screen as currently applied would allow a single carrier to hold all the low-frequency spectrum—700 MHz, SMR, and Cellular—since the low-frequency spectrum comprises less than one-third of the total on a per MHz basis. In contrast a value-based screen where the bandwidth is weighted by relative values would give the correct answer in such a situation—the screen would be triggered.

The spectrum screen should not treat all spectrum the same

- 15. The value of the spectrum varies a great deal based on the frequency band. These value differences have grown as additional bands have been made available to address the rapid increase in mobile broadband demand.
- 16. The different bands have much different propagation characteristics that make the spectrum more or less suitable for mobile broadband use. To illustrate, Figure 1 shows the coverage for three different bands, 800 MHz, 1800 MHz, and 2.6 GHz, as a function of the number of cell sites in the UK to achieve a downlink speed of at least 1.2 Mbps with 20 MHz of spectrum. With 800 MHz, 98% coverage is achieved with only 2,000 sites. With 1800 MHz, more than 10,000 sites are required to achieve 98% coverage. With 2.6 GHz, even 20,000 sites are not enough to achieve 98% coverage. The low-frequency spectrum allows a high level of coverage with a small fraction of the number of sites, and hence much less capital expense. These technical differences among the bands create substantial value differences.

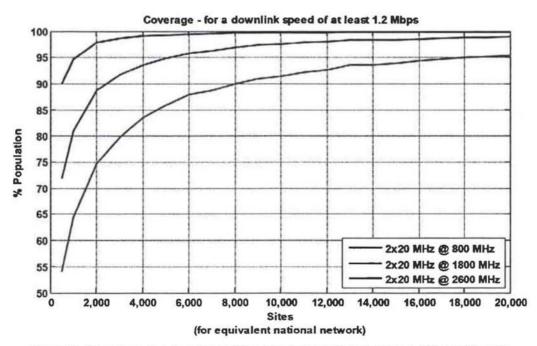


Figure 1. Coverage as a function of the number of sites for three different bands. Source: Ofcom's second consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues (2012).

- 17. The substantial value difference among the bands is well understood by all market participants and is reflected in market valuations and spectrum prices. Both the FCC and the DOJ have recognized the substantial differences in the value of the different bands for mobile service: "As the Commission and DOJ have recognized, spectrum resources in different frequency bands can have widely disparate technical characteristics that affect how the bands can be used to deliver mobile services. The more favorable propagation characteristics of lower frequency spectrum, (i.e., spectrum below 1 GHz) allow for better coverage across larger geographic areas and inside buildings." (FCC 11-188 at pp. 21-22)
- 18. Recent multi-band auctions in Europe illustrate the substantial value difference across the bands. The 2010 auctions in Germany and Italy were the most recent large competitive auctions. The prices of 2x5 MHz lots of 800 MHz and 2.6 GHz spectrum in these auctions are shown in Figure 2. In Germany, each 2x5 MHz lot of 800 MHz sold for about €600 million; whereas each 2x5 MHz lot of 2.6 GHz sold for less than €20 million. In Italy, each 2x5 MHz lot of 800 MHz sold for about €500 million; whereas each 2x5 MHz lot of 2.6 GHz sold for about €36 million. In these recent competitive auctions, the bidders valued the 800 MHz spectrum at 15 to 30 times more than the 2.6 GHz spectrum.

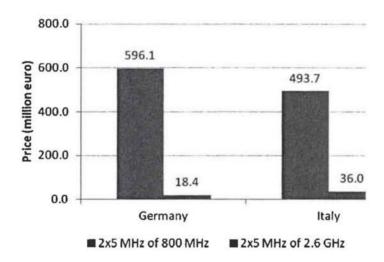


Figure 2. Price of 2x5 MHz of 800 MHz and 2.6 GHz in Germany and Italy 4G auctions of 2010.

- Recent US auctions and other transactions discussed later also confirm the disparity of spectrum values across bands.
- 20. The implication of these market facts is that it makes little sense to use a screen that treats all spectrum the same for the purpose of competitive analysis. Rather the screen should be value based. Such an approach is typically taken in industries where there is substantial heterogeneity in value. For example, when evaluating market shares in diamonds the shares are always in value terms, rather than carats (weight). Similarly, real estate shares are stated in value terms, rather than acres. In all three industries, value differences are so large that a pure quantity-based measure (MHz, carats, or acres) would be misleading.

- 21. Treating all spectrum as equal is an improper simplifying assumption. This may have been a useful assumption when the original spectrum cap was introduced in 1994. Then we had little information about relative values and there was less disparity among the bands. However, with the introduction of more spectrum both above and below 1 GHz, dramatic changes in the mobile broadband market, and much better information about relative values, including many auctions and secondary market transactions, this simplistic approach has long become counterproductive.
- 22. Verizon's strong position in the wireless market has to a large extent come from the better coverage it has been able to offer as a result of holding such a dominant position in the low-frequency spectrum. By 2000 Verizon held roughly one-half of the low-frequency spectrum, about 25 MHz of cellular spectrum. In 2008, this dominance was threatened with the 700 MHz spectrum auction. Verizon understood this potential threat and bid aggressively for and won 49% of the 700 MHz spectrum as shown in Figure 3. This purchase, which did not trigger the simplistic screen, let Verizon sustain its dominant position in the low-frequency spectrum.

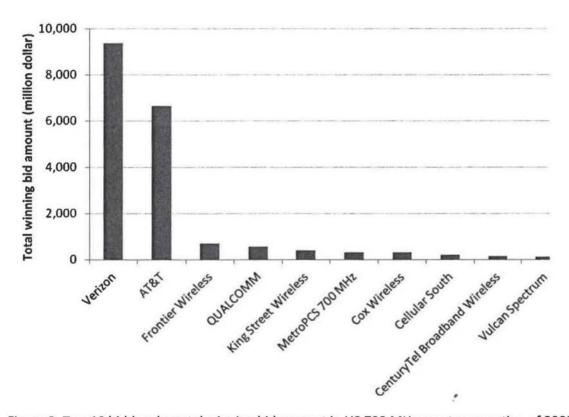


Figure 3. Top-10 bidders by total winning bid amount in US 700 MHz spectrum auction of 2008.

- 23. Indeed, the simplistic screen has likely motivated Verizon to invest heavily in the low-frequency spectrum. Verizon can weaken the impact of the spectrum constraint by acquiring higher quality spectrum. The better (low-frequency) spectrum enables Verizon to provide more communications at lower cost and therefore gives it a disproportionate spectrum capability under the current unweighted screen.
- 24. Unfortunately the resulting domination in the low-frequency spectrum is not healthy for competition. It means that Verizon can provide better depth of coverage (inside buildings) and

better breadth of coverage (in less populated areas) at much lower cost than smaller rivals. Customers value the better coverage and many switch to Verizon. This puts Verizon in an even more dominant market position, enabling Verizon to take advantage of further scale economies in network infrastructure, backhaul, and equipment.

25. Other countries have had similar experiences. Market success often hinges on holding spectrum below 1 GHz, since this spectrum allows better coverage. For this reason, regulators in other countries, such as Australia, United Kingdom, France, Germany, Ireland, Italy, Spain, Portugal, Sweden, and Switzerland, have adopted competition policies that recognize the differences among the bands.

A value-based screen is easy to construct and a better measure of capacity

- 26. An effective way to account for the greater value of spectrum below 1 GHz is to adopt the value-based screen proposed here. This is a simple and common approach to address large value differences. We simply weight the spectrum holdings in each band by relative value. A key advantage of this approach is that it is a straightforward revision of the existing screen.
- 27. The change clearly provides a better measure of competition concerns, and therefore is an appropriate and essential change in evaluating future spectrum acquisitions, such as Verizon's proposed acquisition. In assessing past transactions, the FCC has routinely made revisions to the screen, whenever the revision would improve the screen's ability to measure spectrum aggregation. The weighting I propose is just such an improvement, and a very important one.
- 28. To show how easy it is to use a value-based screen, I will construct one. Only a single new input is required: the relative value weights for each band. There is now reliable information on relative values for the various bands. For example, a recent J.P. Morgan analysis provided the following relative values of wireless spectrum:¹

Band	Relative value (\$/MHz-pop)
Cellular	1.70
700 MHz	1.37
PCS	0.76
AWS	0.76
MMDS	0.25
2.5 GHz	0.19

6

¹ J.P. Morgan, "Spectrum Valuation Overview – Carrier by Carrier Base-Case Spectrum Value Across Wireless Industry," Telecom Services and Towers, North American Equity Research, 30 November 2011.

29. Deutsche Bank equity research estimates values of large spectrum auctions and transactions as follows:²

Band	Year	Transaction	Relative value (\$/MHz-pop)	Average band value (\$/MHz-pop)
700 MHz	2008	FCC Auction 73	1.28	1.07
	2008	Sale of 700 MHz by Aloha Partner to AT&T	1.06	
	2010	Sale of 700 MHz by Qualcomm to AT&T	0.87	
PCS	2005	FCC Auction 58	0.98	0.98
AWS-1	2006	FCC Auction 66	0.54	0.61
	2011	Pending sale of AWS-1 by SpectrumCo/Cox to Verizon	0.67	
2.5 GHz	2007	Sale of 2.5 GHz by AT&T to Clearwire	0.17	0.17

30. The prices per MHz-pop from US AWS-1 and 700 MHz spectrum auctions are shown in Figure 4. These auctions are especially relevant in assessing relative values, since they are the only two major US auctions of mobile broadband spectrum in recent years (AWS-1 in 2006 and 700 MHz in 2008).

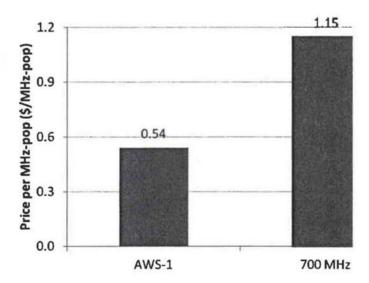


Figure 4. Price per MHz-pop in AWS-1 and 700 MHz spectrum auctions.

31. Relative values thus can be assessed from equity research, recent auctions and other arms-length transactions, as well as engineering studies of the capabilities of the different bands. Based on this information, the following value weights seem plausible and even conservative in that if anything they likely understate relative value differences:

² Deutsche Bank, "Key Updates on Major Spectrum Deals," US Telecom Services, Market Research, 5 February 2012.

Band	Value weight			
Cellular	1.7			
700 MHz	1.5			
SMR	1.5			
AWS/PCS	.75			
BRS	.20			

32. These weights are all that is needed in determining and applying the spectrum screen. The table below shows the construction of the value-based screen. It assumes 14 MHz of SMR spectrum, consistent with FCC arguments in the recent decision on the AT&T acquisition of Qualcomm spectrum. It also adds 10 MHz for the PCS G Block.

Band	Price	Weight	MHz	Value
Cellular	\$1.70	1.7	50	85
700 MHz	\$1.37	1.5	70	105
SMR		1.5	14	21
AWS/PCS	\$0.76	0.75	220	165
BRS	\$0.19	0.2	55.5	11
Total		409.5	387	
One-third scree		137	129	

- 33. Assuming a trigger equal to one-third of total spectrum value, based on previous FCC decisions triggering the screen at approximately one-third of available spectrum, the screen is found by dividing the total available of 387 (value weighted) by 3, to yield a threshold of 129.
- 34. One critique of the weighted screen is that it requires the FCC to make a judgment about the relative values of the bands. However, the current unweighted screen implicitly has the FCC making the judgment that all the bands are equal in their capability for providing mobile service—a judgment that all parties, including the FCC and DOJ, agree is wrong. Substituting a reasoned judgment for an incorrect one results in an improved measure of the competitive impact of a carrier's spectrum holdings. Such judgments are inevitable in setting any spectrum screen.
- 35. Figure 5 applies the weighted screen to the current spectrum holdings of the top-5 carriers in the top-25 markets. The holdings reflect the recent transfer of spectrum from AT&T to T-Mobile as part of the breakup, as well as the recent AT&T and Qualcomm transaction. Verizon's holdings are before its proposed acquisition of spectrum from SpectrumCo and Cox, but include the Verizon-Leap transaction.
- 36. Figure 6 shows Verizon's holdings both before and after the proposed SpectrumCo/Cox acquisition. The Verizon acquisition triggers the weighted screen in many major markets, suggesting that the acquisition raises important competition concerns.

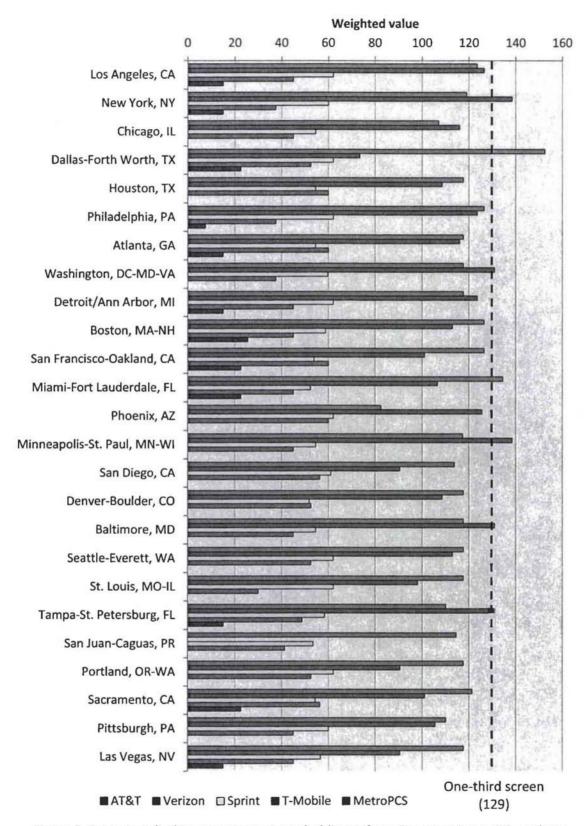


Figure 5. Screen applied to current spectrum holdings of top-5 carriers in top-25 markets.

Note: Verizon holdings prior to the pending Verizon-SpectrumCo/Cox transaction; Verizon-Leap and AT&T-T-Mobile transactions included *pro forma*.

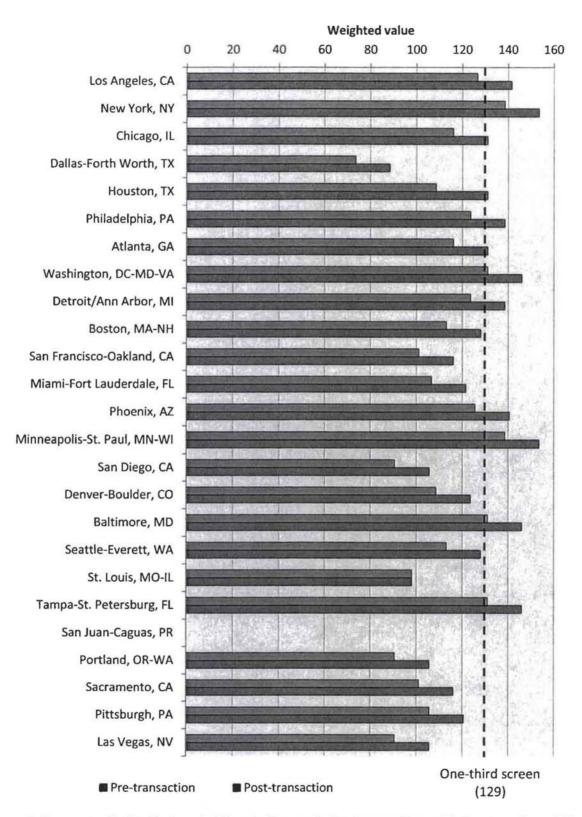


Figure 6. Screen applied to Verizon holdings before and after transactions with SpectrumCo and Cox.

Note: Verizon post-transaction holdings pro forma SpectrumCo, Cox, and Leap transactions.

37. Without such value-weighting, the spectrum screen fails to identify potentially harmful concentrations of scarce spectrum resources. Weighting spectrum by value provides a better measure of the market's view of the capability of spectrum resources essential for mobile broadband. With the improved weighted measure, the FCC can safely adjust the screen. With the poor (unweighted) measure, any reduction in the screen level has two undesirable consequences: 1) it encourages greater concentration of the most valuable spectrum as the largest carriers seek to relax the constraint of the screen, and 2) it limits the aggregation of less valuable spectrum by the smaller carriers, which would be an efficient way for them to seek to compete with the holders of "beachfront" spectrum.

Conclusion

- 38. The current spectrum screen, by treating all spectrum as equal, provides a poor measure of the competitive impact of spectrum acquisitions. The screen is easily fixed by weighting spectrum according to relative values, as is done in other industries. Doing so greatly improves the screen's effectiveness as a diagnostic tool to prevent an excessive concentration of spectrum and therefore safeguard the public interest.
- 39. With a better measure of competitive impact the improved screen can effectively be adjusted to improve the FCC's approach to identifying markets that need a heightened level of competitive scrutiny, and where divestitures may be required to satisfy the public interest.

I declare under penalty of perjury that the foregoing is true and correct.

Peter Cramton

Executed on 20 February 2012

Camton

CERTIFICATE OF SERVICE

I, Kimberly A. Lacey, hereby certify that on this 21st day of February 2012, I have caused a copy of the foregoing **Petition to Deny of T-Mobile USA**, **Inc.** to be served as specified upon the parties below:

Katharine R. Saunders	Michael Samsock
Verizon	Verizon
1320 North Courthouse Road, 9th Floor	1300 I Street, N.W.
Arlington, VA 22201	Suite 400 West
katharine.saunders@verizon.com	Washington, DC 20005
Counsel for Cellco Partnership d/b/a Verizon	michael.samsock@verizonwireless.com
Wireless	Cellco Partnership d/b/a Verizon Wireless
(Via Electronic Mail - Redacted Version)	(Via Electronic Mail - Redacted Version)
J. G. Harrington	Jennifer Hightower
Christina H. Burrow	Cox TMI Wireless, LLC
Dow Lohnes PLLC	1400 Lake Hearn Drive
1200 New Hampshire Avenue, N.W., Suite 800	Atlanta, GA 30319
Washington, DC 20036	Cox TMI Wireless, LLC
cburrow@dowlohnes.com	(Via First Class Mail - Redacted Version)
jharrington@dowlohnes.com	25
Counsel for Cox TMI Wireless, LLC	
(Via Electronic Mail - Redacted Version)	
Michael H. Hammer	David Don
Brien C. Bell	SpectrumCo LLC
Michael G. Jones	300 New Jersey Avenue, N.W.
Willkie Farr & Gallagher LLP	Suite 700
1875 K Street, N.W.	Washington, DC 20001
Washington, DC 20006	SpectrumCo LLC
mhammer@willkie.com	(Via First Class Mail - Redacted Version)
mjones@willkie.com	The second states and the second seco
bbell@willkie.com	
Counsel for SpectrumCo LLC	
(Via Electronic Mail - Redacted Version)	
Sandra Danner	Joel Taubenblatt
Broadband Division	Spectrum and Competition Policy Division
Wireless Telecommunications Bureau	Wireless Telecommunications Bureau
Federal Communications Commission	Federal Communications Commission
445 12th Street, S.W., Room 3A-266	445 12th Street, S.W.
Washington, DC 20554	Washington, DC 20554
sandra.danner@fcc.gov	joel.taubenblatt@fcc.gov
(Via Hand Delivery - Confidential Version)	(Via Electronic Mail - Redacted Version)
(Via Electronic Mail - Redacted Version)	
Jim Bird, Office of General Counsel	Best Copy and Printing, Inc.
Federal Communications Commission	445 12th St., S.W.
445 12th Street, S.W.	Washington, D.C. 20554
Washington, D.C. 20554	FCC@BCPIWEB.COM
jim.bird@fcc.gov	(Via Electronic Mail - Redacted Version)
(Via Electronic Mail - Redacted Version)	

/s/ Kimberly A. Lacey
Kimberly A. Lacey